APPENDIX A.5

Freshwater Mussel
Species of Conservation Priority Accounts

Threeridge
Level II

Scientific Name: *Amblema plicata*


Chris Grondahl

General Description: Shell up to 4 inches in length. The shell is generally thick, round and compressed. Coloration is yellow-green or brown. There are three distinct ridges in the shell that run from the hinge to the edge of the shell.

Status: Year-round resident.

Abundance: Locally common.

Primary Habitat: Prefer small to large rivers with a mud, sand or gravel substrate. In North Dakota confined to larger rivers.

Federal Status: No federal status.

Reason for Designation: Believed to be declining in state waters. Changes in land use in and around these rivers, most notably agriculture, and impoundment of river systems, may impact mussel populations. They are also of commercial value and are protected from harvest in North Dakota.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat
Threeridge prefer large river systems. The substrate of the river is normally mud, sand, or gravel.

Key Areas for Threeridge in North Dakota
Found only in the Red and Sheyenne rivers. It is found in highest concentrations in the section of the Sheyenne River in Ransom County.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat
Impoundment of the Red River and its tributaries have changed the flow regime and increased sediment deposits, making many areas in the river unsuitable to the threeridge. Impoundments also block movement of host fish necessary for reproduction and dispersal of this species.
Secondly, agricultural practices within the basin have reduced suitable river habitat. Runoff from treated fields into the river decreases water quality. Ditches used to drain fields contribute agriculture run-off and sediments to waterways.

Other Natural or Manmade Factors
The threeridge is considered a commercially valuable species. It is presently illegal to collect mussels for commercial use in North Dakota, but this practice may occur in parts of its range. This may contribute to an already declining population.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts
- The NDDoH will begin Index of Biotic Integrity (IBI) surveys for state rivers in 2005. These surveys will include freshwater mussels.

Previous Research and Survey Efforts
- Cvancara conducted a statewide survey of the mollusks of North Dakota in 1978.

- The North Dakota Game and Fish Department revisited the Red river and its tributary sites in 1990.
- Valley City State University conducted a small-scale survey of the Sheyenne River in 2004.

Additional Research and Survey Efforts Needed

- A revisit of all of Cvancara's sites along with a habitat component is necessary to update the population status of freshwater mussels since 1978.

MONITORING PLANS

- No monitoring plan has been developed for freshwater mussels. Surveys by Cvancara will be used as a template.

REFERENCES

Cummings, K.S., and C.A. Mayer. 1992. Field Guide to Freshwater Mussels of the Midwest. Illinois Natural History Survey Manual 5. 194 pp.

Cvancara, Alan M. 1983. Aquatic Mollusks of North Dakota. North Dakota Geological Survey, Report of Investigation No. 78. 141 pp.

Jensen, W.F, R.L. Kreil, S.R. Dyke, J.S. Schumacher, and M.G. McKenna. 2001. Distribution, relative abundance, and species diversity of freshwater mussels in the Sheyenne and Red rivers of eastern North Dakota. North Dakota Game and Fish. Div Rpt 42, 20 pp.

Heath, D.J., et al. 1988. An assessment of the 1986 commercial harvest of freshwater mussels in the Mississippi River bordering Wisconsin. Report to Wisconsin Department of Natural Resources. 28 pp.

Williams, J.D., Neves, R.J. La Roe, ET, Farris, G.S., Puckett, C.E., Doran, P.D., Mac, M.J. 1995. Freshwater mussels: a neglected and declining aquatic resource. In: *Our living resources: a report to the nation on the distribution, abundance, and health of US plants, animals, and ecosystems*. US Department of the Interior, National Biological Service, Washington, DC, pp 177-179.

Wabash Pigtoe

Level II

Scientific Name: *Fusconaia flava*

General Description: The shell is up to 3 inches in length. The shape is variable, but generally thick and compressed. Commonly a triangular shape. Younger individuals yellow in color with faint green rays, becoming dark brown with age.

Status: Year-round resident.

Abundance: Locally common.

Primary Habitat: Large rivers with mud or sand bottoms.

Federal Status: No federal status.

Reason for Designation: Changes in land use around these rivers, most notably agriculture, and impoundment of river systems may impact freshwater mussel populations. This species is protected from commercial harvest.

Chris Grondahl

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Prefer large river systems with channel width greater than 11 m. The river substrate is normally mud or sand.

Key Areas for Wabash Pigtoe in North Dakota

Found only in the Red and Sheyenne rivers. It is found in the highest concentrations in the section of the Sheyenne River in Ransom County.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundment of the Red River and its tributaries have changed the flow regime and increased sediment deposits, making many areas in the river unsuitable to this species. Impoundments also block movement of host fish needed for reproduction and dispersal. Secondly, agricultural practices within the basin have reduced suitable habitat in the river. Runoff from treated fields into waterways decreases water quality. Ditches used to drain wetlands and fields contribute to run-off and sedimentation in the Red River and its tributaries.

Other Natural or Manmade Factors

The wabash pigtoe is considered a commercially valuable species. It is presently illegal to collect mussels for commercial use in North Dakota, but this practice may occur in parts of its range. This may contribute to an already declining population.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- The NDDoH is initiating freshwater mussel surveys this year (2005) as a part of its Index of Biotic Integrity (IBI) work on the state waters. This work will cover all drainages in the state with one being covered each year.

Wabash Pigtoe
Level II

Previous Research and Survey Efforts

- Cvancara conducted a statewide survey of mollusks in North Dakota in 1978.
- The NDGFD revisited the Red River and its tributary sites in 1990.
- Valley City State University conducted a small-scale survey of the Sheyenne River in 2004.

Additional Research and Survey Efforts Needed

- A revisit of all of Cvancara's sites along with a habitat component is necessary to update the population status of freshwater mussels since 1978.

MONITORING PLANS

- No monitoring plan has been developed for freshwater mussels. Surveys by Cvancara will be used as a template.

REFERENCES

Cummings, K.S., and C.A. Mayer. 1992. Field Guide to Freshwater Mussels of the Midwest. Illinois Natural History Survey Manual 5. 194 pp.

Cvancara, Alan M. 1983. Aquatic Mollusks of North Dakota. North Dakota Geological Survey, Report of Investigation No. 78. 141 pp.

Jensen, W.F, R.L. Kreil, S.R. Dyke, J.S. Schumacher, and M.G. McKenna. 2001. Distribution, relative abundance, and species diversity of freshwater mussels in the Sheyenne and Red rivers of eastern North Dakota. North Dakota Game and Fish. Div Rpt 42, 20 pp.

Heath, D.J., et al. 1988. An assessment of the 1986 commercial harvest of freshwater mussels in the Mississippi River bordering Wisconsin. Report to Wisconsin Department of Natural Resources. 28 pp.

Williams, J.D., Neves, R.J. La Roe, ET, Farris, G.S., Puckett, C.E., Doran, P.D., Mac, M.J. 1995. Freshwater mussels: a neglected and declining aquatic resource. In: *Our living resources: a report to the nation on the distribution, abundance, and health of US plants, animals, and ecosystems*. US Department of the Interior, National Biological Service, Washington, DC, pp 177-179.

Mapleleaf

Level II

Scientific Name: *Quadrula quadrula*

General Description: Shell up to 4 inches in length. This species is a thick-shelled mussel. Tooth is well developed. Anterior rounded and posterior generally square. Two rows of raised nodules extending from hinge.

Status: Year round resident

Abundance: Rare

Primary Habitat: Found in the Red River in areas of mud or gravel bottom.

Federal Status: No federal status

Reason for Designation: Changes in land use in and around these rivers, most notably agriculture, and impoundment of river systems have impacted beds of these mussels. They are also of commercial value and are protected from harvest in North Dakota.

Chris Grondahl

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

The mapleleaf is found in medium to large rivers with gravel or mud bottoms. Usually associated with deeper water in areas where the channel width is 30-88m wide.

Key Areas for Mapleleaf in North Dakota

The Red River is the only place where this species has ever been documented alive. This species may also be found in parts of the Sheyenne River.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundment of the Red River and its tributaries has changed the flow regime and increased sediment deposits making many areas in the river unsuitable to the mapleleaf. Impoundments also impede the movement of host fish needed for reproduction and dispersal. Secondly, agricultural practices within the basin have reduced suitable habitat in the river. Runoff from treated fields into the river decreases water quality. Ditches used to drain wetlands and fields contribute to run-off and sedimentation in the Red River and its tributaries. These practices may contribute to this species' decline. Freshwater mussels are generally intolerant of pollution.

Other Natural or Manmade Factors

The mapleleaf is considered a commercially valuable species. It is presently illegal to collect mussels for commercial use, but this practice may occur in parts of its range.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- The NDDoH will initiate mussel surveys this summer (2005) as a part of its Index of Biotic Integrity (IBI) work on state watersheds. This will cover all of the state's watersheds, with one being done each year.

Previous Research and Survey Efforts

- Cvancara conducted a statewide survey of the mollusks of North Dakota in 1978.
- The North Dakota Game and Fish Department revisited the Red River and its tributary sites in 1990
- Valley City State University conducted a small-scale survey of the Sheyenne River in 2004.

Additional Research and Survey Efforts Needed

- A revisit of all of Cvancara's sites along with a habitat component is necessary to update the population status of freshwater mussels since 1978.
- Develop a monitoring protocol for freshwater mussels.

MONITORING PLANS

- No monitoring plan has been developed for freshwater mussels to this point. Surveys by Cvancara will be used as a template.

REFERENCES

Cummings, K.S., and C.A. Mayer. 1992. Field Guide to Freshwater Mussels of the Midwest. Illinois Natural History Survey Manual 5. 194 pp.

Cvancara, Alan M. 1983. Aquatic Mollusks of North Dakota. North Dakota Geological Survey, Report of Investigation No. 78. 141 pp.

Jensen, W.F, R.L. Kreil, S.R. Dyke, J.S. Schumacher, and M.G. McKenna. 2001. Distribution, relative abundance, and species diversity of freshwater mussels in the Sheyenne and Red rivers of eastern North Dakota. North Dakota Game and Fish. Div Rpt 42, 20 pp.

Heath, D.J., et al. 1988. An assessment of the 1986 commercial harvest of freshwater mussels in the Mississippi River bordering Wisconsin. Report to Wisconsin Department of Natural Resources. 28 pp.

Williams, J.D., Neves, R.J. La Roe, ET, Farris, G.S., Puckett, C.E., Doran, P.D., Mac, M.J. 1995. Freshwater mussels: a neglected and declining aquatic resource. In: *Our living resources: a report to the nation on the distribution, abundance, and health of US plants, animals, and ecosystems*. US Department of the Interior, National Biological Service, Washington, DC, pp 177-179.

Black Sandshell

Level II

Scientific Name: *Ligumia recta*

Chris Grondahl

General Description: Shell elongated and generally flattened. This species can reach up to 4 ½ inches in length. Shell is smooth, shiny, and generally dark in color. Nacre is pink, purple, or white in coloration.

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Found in the Red River and lower Sheyenne River. Generally found in riffles or areas of swift current with a gravel or sand bottom.

Federal Status: Presently holds no federal status.

Reason for Designation: Changes in land use in and around the rivers it inhabits, most notably agriculture, and impoundment, have impacted this species.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Inhabit large to medium rivers nationwide but confined to large turbid rivers in North Dakota. Found in riffles and raceways in these rivers.

Key Areas for Black Sand Shell in North Dakota

Found in the in Red River north of the confluence with the Sheyenne River. Also found in the Sheyenne River from its confluence with the Red River to below Baldhill Dam.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundment of the Red River and its tributaries have changed the flow regime and increased sediment deposits, making many areas in the river unsuitable to the black sandshell. Impoundments also block host fish movement. These fish are a necessary component of reproduction and dispersion of this species. Secondly, agricultural practices within the basin have reduced suitable habitat in the rivers. Runoff from treated fields into the river decreases water quality. Ditches used to drain wetlands contribute to agricultural run-off and sedimentation in the Red River and its tributaries.

Other Natural or Manmade Factors

No other threats have yet been identified.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- The NDDoH will initiate freshwater mussel surveys for states waters as a segment of its Index of Biotic Integrity (IBI) work. This work will begin in the summer of 2005.

Previous Research and Survey Efforts

- Cvancara conducted a statewide survey of mollusks in North Dakota in 1978.
- The North Dakota Game and Fish Department revisited the Red River and its tributary sites in 1990.

- A small scale sample of the Sheyenne River was conducted by Valley City State University in the fall of 2004.

Additional Research and Survey Efforts Needed

- A revisit of all of Cvancara's sites along with a habitat component is necessary to update the population status of freshwater mussels since 1978.
- Develop a monitoring plan to track the status of mussel populations in North Dakota waters.

MONITORING PLAN

- No specific monitoring plan has been developed to track freshwater mussel species. Survey effort by Cvancara will be used as a model to develop this.

REFERENCES

Cummings, K.S., and C.A. Mayer. 1992. Field Guide to Freshwater Mussels of the Midwest. Illinois Natural History Survey Manual 5. 194 pp.

Cvancara, Alan M. 1983. Aquatic Mollusks of North Dakota. North Dakota Geological Survey, Report of Investigation No. 78. 141 pp.

Jensen, W.F, R.L. Kreil, S.R. Dyke, J.S. Schumacher, and M.G. McKenna. 2001. Distribution, relative abundance, and species diversity of freshwater mussels in the Sheyenne and Red rivers of eastern North Dakota. North Dakota Game and Fish. Div Rpt 42, 20 pp.

Heath, D.J., et al. 1988. An assessment of the 1986 commercial harvest of freshwater mussels in the Mississippi River bordering Wisconsin. Report to Wisconsin Department of Natural Resources. 28 pp.

Williams, J.D., Neves, R.J. La Roe, ET, Farris, G.S., Puckett, C.E., Doran, P.D., Mac, M.J. 1995. Freshwater mussels: a neglected and declining aquatic resource. In: *Our living resources: a report to the nation on the distribution, abundance, and health of US plants, animals, and ecosystems*. US Department of the Interior, National Biological Service, Washington, DC, pp 177-179.

Creek Heelsplitter

Level II

Scientific Name: *Lasmigona compressa*

General Description: Shell relatively thin, flattened, and elongated up to 3 inches in length. Yellow in color with green rays extending from back along top. Darker in larger shells.

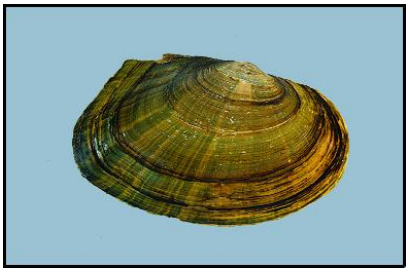
Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Found in the Pembina, Forest, Wintering and Sheyenne rivers. Generally in headwaters of small streams with sandy bottoms.

Federal Status: No federal status.

Reason for Designation: Changes in land use in around these rivers, most notably agriculture, and impoundment of river systems have impacted beds of these mussels.



USFWS

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Found in headwaters of small and medium-sized streams.

Key Areas for Creek Heelsplitter in North Dakota

The creek heelsplitter is found most frequently in the Wintering River. It is also found in the Pembina, Forest, and Sheyenne rivers.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundment of the Red River and its tributaries have changed the flow regime and increased sediment deposits making many areas in the river unsuitable to the creek heelsplitter. Impoundments also block host fish movement necessary for this species' reproduction and dispersal. Secondly, agricultural practices within the basin have reduced suitable habitat in the river. Runoff from treated fields into the river decreases water quality. Ditches used to drain wetlands contribute agricultural run-off and sedimentation to the Red River and its tributaries.

Other Natural or Manmade Factors

No other threats have yet been identified for this species.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- The NDDoH is initiating freshwater mussel surveys as part of the Index of Biotic Integrity (IBI) they will conduct on state watersheds, beginning in 2005.

Previous Research and Survey Efforts

- Cvancara conducted a statewide survey of mollusks in North Dakota in 1978.
- The North Dakota Game and Fish Department revisited the Red River and its tributary sites in 1990.

- A small scale survey of the Sheyenne River was conducted by Valley City State University in 2004.

Additional Research and Survey Efforts Needed

- A revisit of all of Cvancara's sites along with a habitat component is necessary to update the population status of freshwater mussels since 1978.
- Develop a monitoring protocol to track freshwater mussel populations in state waters.

MONITORING PLANS

- No monitoring plan has been developed for freshwater mussels. Surveys by Cvancara will be used as a template.

REFERENCES

Cummings, K.S., and C.A. Mayer. 1992. Field Guide to Freshwater Mussels of the Midwest. Illinois Natural History Survey Manual 5. 194 pp.

Cvancara, Alan M. 1983. Aquatic Mollusks of North Dakota. North Dakota Geological Survey, Report of Investigation No. 78. 141 pp.

Jensen, W.F, R.L. Kreil, S.R. Dyke, J.S. Schumacher, and M.G. McKenna. 2001. Distribution, relative abundance, and species diversity of freshwater mussels in the Sheyenne and Red rivers of eastern North Dakota. North Dakota Game and Fish. Div Rpt 42, 20 pp.

Heath, D.J., et al. 1988. An assessment of the 1986 commercial harvest of freshwater mussels in the Mississippi River bordering Wisconsin. Report to Wisconsin Department of Natural Resources. 28 pp.

Williams, J.D., Neves, R.J. La Roe, ET, Farris, G.S., Puckett, C.E., Doran, P.D., Mac, M.J. 1995. Freshwater mussels: a neglected and declining aquatic resource. In: *Our living resources: a report to the nation on the distribution, abundance, and health of US plants, animals, and ecosystems*. US Department of the Interior, National Biological Service, Washington, DC, pp 177-179.

Pink Heelsplitter

Level II

Scientific Name: *Potamilus alatus*

General Description: Large shell, up to 8 inches. Generally rectangular in shape. Posterior end flat and anterior end rounded. Shell dark green to brown.

Status: Year-round resident.

Abundance: Locally common.

Primary Habitat: Medium to large rivers. Bottom substrate mud or a mix of mud and sand.

Federal Status: No federal status.

Reason for Designation: Changes in land use in around these rivers, most notably agriculture, and impoundment of river systems have impacted beds of these mussels.

Chris Grondahl

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Found in large rivers with a channel width of 18-63 m.

Key Areas for Pink Heelsplitter in North Dakota

Found in the Red and Sheyenne rivers. Highest concentrations found in the Red River near the town of Argusville.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundments of the Red River and its tributaries have changed the flow regime and increased sediment deposits, making many areas in these rivers unsuitable to the pink heelsplitter. Impoundments also block host fish movement necessary for this species' reproduction and dispersal. Secondly, agricultural practices within the basin have reduced suitable habitat in the river. Runoff from treated fields into the river decreases water quality. Ditches used to drain wetlands contribute to agricultural run-off and sedimentation in the Red River and its tributaries.

Other Natural or Manmade Factors

The pink heelsplitter is considered a commercially valuable species. It is presently illegal to collect mussels for commercial use, but this practice may occur in parts of its range. This may contribute to an already declining population.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- The NDDoH will initiate mussel surveys in state watersheds as a part of its Index of Biotic Integrity (IBI) work, beginning in 2005.

Previous Research and Survey Efforts

- Cvancara conducted a statewide survey of the mollusks of North Dakota in 1978.

- The North Dakota Game and Fish Department revisited the Red River and its tributary sites in 1990.
- A small-scale survey of the Sheyenne River is being conducted by Valley City State University.

Additional Research and Survey Efforts Needed

- A revisit of all of Cvancara's sites along with a habitat component is necessary to update the population status of freshwater mussels since 1978.

MONITORING PLANS

- No monitoring plan has been developed for freshwater mussels. Surveys by Cvancara will be used as a template.

REFERENCES

Cummings, K.S., and C.A. Mayer. 1992. Field Guide to Freshwater Mussels of the Midwest. Illinois Natural History Survey Manual 5. 194 pp.

Cvancara, Alan M. 1983. Aquatic Mollusks of North Dakota. North Dakota Geological Survey, Report of Investigation No. 78. 141 pp.

Jensen, W.F, R.L. Kreil, S.R. Dyke, J.S. Schumacher, and M.G. McKenna. 2001. Distribution, relative abundance, and species diversity of freshwater mussels in the Sheyenne and Red rivers of eastern North Dakota. North Dakota Game and Fish. Div Rpt 42, 20 pp.

Heath, D.J., et al. 1988. An assessment of the 1986 commercial harvest of freshwater mussels in the Mississippi River bordering Wisconsin. Report to Wisconsin Department of Natural Resources. 28 pp.

Williams, J.D., Neves, R.J. La Roe, ET, Farris, G.S., Puckett, C.E., Doran, P.D., Mac, M.J. 1995. Freshwater mussels: a neglected and declining aquatic resource. In: *Our living resources: a report to the nation on the distribution, abundance, and health of US plants, animals, and ecosystems*. US Department of the Interior, National Biological Service, Washington, DC, pp 177-179.

Pink Papershell

Level III

Scientific Name: *Potamilus oheinsis*

General Description: Large mussel with a maximum length of 7 inches. Shell is elongated and generally rectangular. Wing present near the umbos. Shell dark green to brown. Nacre is pink.

USFWS

Status: Year-round resident.

Abundance: Rare.

Primary Habitat: Medium to larger rivers. Bottom substrate generally mud or sand.

Federal Status: No federal status.

Reason for Designation: Changes in land use around rivers, most notably agriculture and impoundment of river systems, have impacted this species.

LOCATIONS AND CONDITIONS OF KEY HABITAT

Preferred Habitat

Pink Papershell prefer large river systems, but was collected only from tributaries of the Missouri River with a stream width of 14 to 30m. The substrate of the river is normally mud, sand, or gravel.

Key Areas for Pink Papershell in North Dakota

Found only in the lower reaches of the Missouri River and tributaries below Garrison Dam in North Dakota.

PROBLEMS WHICH MAY AFFECT THIS SPECIES

Habitat

Impoundments built on the Missouri River System have changed the flow regime of the river. Water released from the dam is cooler, cleaner, and moving faster. This has changed the historic habitat conditions of the river system.

Other Natural or Manmade Factors

Impoundments in the system block movement of fish species used by the pink papershell as hosts for young. In this case, the most common host is the freshwater drum.

RESEARCH AND SURVEY EFFORTS

Current Research and Survey Efforts

- The NDDoH is initiating freshwater mussel surveys of the state watersheds as a segment of its Index of Biotic Integrity (IBI) work, beginning in 2005.

Previous Research and Survey Efforts

- Cvancara conducted a statewide survey of the mollusks of North Dakota in 1978.

Additional Research and Survey Efforts Needed

- A revisit of all of Cvancara's sites along with a habitat component is necessary to update the population status of freshwater mussels since 1978.

Pink Papershell

Level III

MONITORING PLANS

- No monitoring plan has been developed for freshwater mussels to this point. Surveys by Cvancara will be used as a template.

REFERENCES

Cummings, K.S., and C.A. Mayer. 1992. Field Guide to Freshwater Mussels of the Midwest. Illinois Natural History Survey Manual 5. 194 pp.

Cvancara, Alan M. 1983. Aquatic Mollusks of North Dakota. North Dakota Geological Survey, Report of Investigation No. 78. 141 pp.

Jensen, W.F, R.L. Kreil, S.R. Dyke, J.S. Schumacher, and M.G. McKenna. 2001. Distribution, relative abundance, and species diversity of freshwater mussels in the Sheyenne and Red rivers of eastern North Dakota. North Dakota Game and Fish. Div Rpt 42, 20 pp.

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